Response to ‘The empty brain’

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Dr. Robert Epstein, a senior research psychologist at the American Institute for Behavioral Research and Technology in California has written many books and articles with strong and unique opinions about some of the most challenging problems in cognitive science. He has several articles on aeon and medium and one of the medium articles’ description reads: “Philosophers and neuroscientists be damned — there is nothing even slightly mysterious about consciousness”[1]. While that is a story for some other time, his critique on the Computational Theory of Mind through the essay ‘The empty brain’ is especially controversial, where he tries to explain the readers why our brain is not a computer, why we don’t process informations by retrieving data from our memory units and why it is just another metaphor like the six others described by George Zarkadakis in his book *‘In Our Own Image (2015)*’. Dr. Epstein feels each metaphor is a reflection of the most advanced thinking of the era that spawned it and thus, we are all infected by the idea of human brains working as computers just like the invention of hydraulic engineering in the 3rd century BCE led to the popularity of a hydraulic model of human intelligence, the idea that the flow of different fluids in the body – the ‘humours’ – accounted for both our physical and mental functioning. He, through this essay, wants the reader to realize that humans are organisms and not computers that store, retrieve and process information, that use symbols and representations, that use rules and softwares.

I would first like to point out one of the basic logical inconsistencies in his essay and his scepticism for The computational theory of mind which, I think, is based on a faulty syllogism – one with two reasonable premises and a faulty conclusion.
-*Reasonable Premise 1*: The Computational theory of mind believes that the human mind is an information processing system and that cognition and consciousness together are a form of computation.
-*Reasonable Premise 2*: Modern digital computers are information processing systems which compute.
-*Faulty Conclusion*: The Computational theory of mind believes that human mind is just like modern day digital computer.
What he is rejecting is the idea of “*Computer metaphor*” [2] which is not the same as The Computational Theory of Mind (CTM). He uses very strongly biased words which have been associated with computers for a long time like information, data, rules, software, knowledge, lexicons, representations, algorithms, programs, models, memories, images, processors, subroutines, encoders, decoders, symbols, or buffers and then tries to ‘manipulate’ readers with the biases we have regarding these words. For a long time we have been associating these words with a mechanical machine or digital computers and we usually think of humans opposite to machines. But the flaw is that rejecting the idea that human mind is a computer is not a valid argument against CTM.

He gives an example of the basketball player trying to catch a ball does not calculate the force of the impact, the angle of the trajectory, that kind of thing – then it doesn't create and analyse an internal model of the path along which the ball will likely move to use that model to guide and adjust motor movements continuously in time in order to intercept the ball, the player just needs to keep a constant visual relationship with respect to home plate and the surrounding scenery. But how does he keep that visual relationship is the question. If the player is not processing information, how does he do it?
He argues that since brains do not have a 'memory bank' from which we can 'retrieve' the 'representation' of the dollar bill we probably don't work like computers. While this certainly is true, but what is incorrect is to use this argument to deny CTM.

In the complete essay, he has always argued against the motion that brains/minds and computers have same **implementation** to process information, not the motion that the brain/mind is an information processor. He has stated his beliefs as facts which is not enough given the progress 'IP metaphor' has had and given the fact that in a lot of fields where machines till now were not able to beat humans have been defeated by modern state of the art AI models which claim to be inspired by human brain. We cannot deny this and reject the CTM just because it doesn't feel like the reality or because the last six metaphors were not correct, this one will also not be.

The 'IP metaphor' is 'sticky' because it has enabled cognitive scientists and neuroscientists to explain a lot about human brains which was not possible without it. This is not a problem we should deal with, and maybe we don't need to think around it. Through the dollar example, he argued that since we do not have representation of the dollar bills in our neuron, we are not like computers. There is a vast literature which tries to interpret the current deep learning models, which claim to be inspired from human minds, and even in them, it is not possible to point out a neuron which would 'store' the information of the object it recognizes and which could be used to retrieve it.

While it is hard to get convinced by 'The empty brain' that the IP metaphor is silly and we should get rid of it, it definitely points out the fact that the current hardware and implementation techniques we use for our information processors (computers) might be a challenge to understand brain. The hardware was built for computers which followed specific set of instruction following information processors, for systems like the production system and thus, it is hard for the new connectionist type models to perform better on the current hardware. We might actually also need hardware more inspired by our brains to understand mind.

References:

[1]: https://medium.com/the-awl/the-simple-truth-about-consciousness-7b551473a171
[2]: https://en.wikipedia.org/wiki/Computational_theory_of_mind#%22Computer_metaphor%22